

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-30 (Canceled).

Claim 31 (New): A power-splitting infinitely variable transmission with two modes of operation, wherein constituent elements thereof are distributed between two power trains connecting an internal combustion engine in a parallel manner to wheels of the vehicle, including two epicyclic gearsets, two electric machines, one reducing stage, and adjusting means that distribute the power between the two power trains differently depending on the mode of operation thereof, comprising:

- a primary power train on which there is disposed a compound gearset,
- a secondary power train provided with an epicyclic gearset associated with each electric machine of the electric variator, and
- a mode-changing system to selectively immobilize at least one spinning element of one of the epicyclic gearsets associated with one of the electric machines, such that at least one mode of operation of the infinitely variable transmission is selected among a plurality of modes of operation.

Claim 32 (New): A transmission according to claim 31, wherein:

- the internal combustion engine is connected via a reducing stage to a ring gear and to a planet carrier respectively of a first epicyclic gearset and of a second epicyclic gearset of a gearbox proper;

- vehicle wheels are connected to the gearbox via a reducing stage of gear ratio K_0 , one access of which is coupled respectively to the planet carrier and to a ring gear of the first

epicyclic gearset and of the second epicyclic gearset, the first and second epicyclic gearsets constituting a compound epicyclic gearset disposed on the primary power-splitting pathway.

Claim 33 (New): A transmission according to claim 32 wherein a first electric machine of the electric variator is connected to a reducing stage coupled to a sun gear of the first epicyclic gearset and to the ring gear of a third epicyclic gearset, a sun gear of which is coupled to a ring gear of a fourth epicyclic gearset, a sun gear of the third epicyclic gearset and the ring gear of the fourth epicyclic gearset being connected to a frame via a brake, and wherein the planet carrier of the third epicyclic gearset is itself coupled to the frame by a brake.

Claim 34 (New): A transmission according to claim 32, wherein the second electric machine of the electric variator is coupled via a reducing stage with gear ratio K_{e2} to a fourth epicyclic gearset by its sun gear.

Claim 35 (New): A transmission according to claim 31, wherein the reducing stage is provided with a pinion engaged with a toothed wheel mounted on a bearing that is free to rotate around a central gearbox shaft integral with the planet carrier of the second compound epicyclic gearset of the primary power train, and the planet carrier of the first epicyclic gearset is integral with the ring gear of the second epicyclic gearset, the ring gear of the second epicyclic gearset being connected to or integral with the planet carrier.

Claim 36 (New): A transmission according to claim 35, wherein the wheels of the vehicle are coupled on a shaft via a pinion to a toothed wheel, integral with the ring gear of the second epicyclic gearset.

Claim 37 (New): A transmission according to claim 35, wherein:
the secondary power train is provided with third and fourth epicyclic gearsets
respectively, for coupling it to the variator, to the mode-changing system, and to the primary
power train,

the third epicyclic gearset is provided with a sun gear, a ring gear and a planet carrier
integral with a second brake;

the fourth epicyclic gearset is provided with a planet carrier, which couples its sun
gear to its ring gear;

the sun gear of the third epicyclic gearset is integral with the ring gear of the fourth
epicyclic gearset, and the ring gear of the third epicyclic gearset being integral with the sun
gear of the fourth epicyclic gearset;

the shaft of the gearbox being terminated at its other end relative to the internal
combustion engine by a pinion connected to the second electric machine;

the sun gear of the second epicyclic gearset of the compound gearset carrying an
external toothing, which is coupled to a pinion integral with the shaft of the rotor of the first
electric machine of the electric variator.

Claim 38 (New): A transmission according to claim 37, wherein the sun gear of the
third epicyclic gearset and the ring gear of the fourth epicyclic gearset are made integral with
a first lining of a brake, the other lining of the brake being integral with the gearbox case and
a brake actuator making it possible to activate or not activate braking by bringing the two
linings together in response to an adjusting signal from the transmission's mode-of-operation
controller.

Claim 39 (New): A transmission according to claim 37, wherein the planet carrier of the third epicyclic gearset, integral with the ring gear of the fourth epicyclic gearset, is integral with a first lining of a brake, the other lining of brake being integral with the gearbox case, and a brake actuator, associated with the brake of the planet carrier, making it possible to activate or not activate braking thereof by bringing the two linings together in response to an adjusting signal from the transmission's mode-of-operation controller.

Claim 40 (New): A transmission according to claim 31, further comprising an operating controller provided with:

a controller of the operating point of the motive power unit as a function of predetermined stresses;

a controller of the operating point of the internal combustion engine, which controller receives an operating point target value from the controller and generates adjusting signals suitable for actuators for determination of the operating point of the internal combustion engine;

an operating controller of the first and second electric machines such that, for each machine, there are determined its mode of operation, either as a motor or generator, its speed of rotation and/or its torque or else its armature voltage and/or its armature current, especially in relation with a device for management of an electrical energy accumulator, the controller receiving a target value of the operating point from the controller and producing suitable adjusting signals for the pilot-control circuits of the electric machines;

a transmission-mode-changing controller, which determines the open or closed state of the first brake and/or of the second brake such that one mode among at least two modes of operation of the infinitely variable transmission is selected by an adjusting signal of the controller.

Claim 41 (New): A power-splitting infinitely variable transmission with two modes of operation, wherein constituent elements thereof are distributed between two power trains connecting the internal combustion engine in a parallel manner to the wheels of the vehicle, including two epicyclic gearsets, two electric machines, one reducing stage and adjusting means that distribute the power between the two power trains differently depending on the mode of operation thereof, comprising:

a third epicyclic gearset in series with one of the two epicyclic gearsets on one of the two power trains, the said third epicyclic gearset cooperating with the adjusting means such that, in a first mode of operation, all the elements of the third gearset are spinning at the same speed.

Claim 42 (New): A transmission according to claim 41, wherein, on a first power train, the vehicle wheels are connected via a reducing stage to the planet carrier of the first epicyclic gearset, the sun gear of which is connected directly to the shaft of the internal combustion engine, and wherein the second power train is coupled to the first epicyclic gearset by its ring gear.

Claim 43 (New): A transmission according to claim 41, wherein the ring gear of the third epicyclic gearset is connected to the ring gear of the second epicyclic gearset, and wherein the sun gear of the third epicyclic gearset is integral both with the ring gear of the first epicyclic gearset and with the rotor of the first electric machine.

Claim 44 (New): A transmission according to claim 43, wherein the planet carrier of the second epicyclic gearset is connected to the internal combustion engine via a reducing

stage, the reduction ratio of which can be matched to a mechanical power and to an optimal speed of rotation of the internal combustion engine to which it is connected.

Claim 45 (New): A transmission according to claim 44, wherein the sun gear of the second epicyclic gearset is connected to the rotor of the second electric machine.

Claim 46 (New): A transmission according to claim 43, wherein, by activation of the mode-changing system, the planet carrier of the third epicyclic gearset is immobilized on the case via a brake disposed between the case and the planet carrier of the third epicyclic gearset.

Claim 47 (New): A transmission according to claim 46, wherein the planet carrier of the third epicyclic gearset is connected to its sun gear via a clutch adjusted by the mode-changing system.

Claim 48 (New): A transmission according to claim 41, wherein the second and third epicyclic gearsets are provided with a common ring gear, in that the planet carrier of the third epicyclic gearset spins freely around the shaft of its sun gear, the shaft being connected to the shaft carrying the ring gear of the first epicyclic gearset, in that the planet carrier of the second epicyclic gearset spins freely around the shaft of its sun gear, the shaft being connected to the shaft of the rotor of the second electric machine, and the planet carrier of the first epicyclic gearset spins freely around the shaft of its sun gear, the shaft being integral at its two ends with the engine shaft of the internal combustion engine and of the sun gear.

Claim 49 (New): A transmission according to claim 48, wherein the first electric machine is disposed outside the common axis of the internal combustion engine and of the first, second and third epicyclic gearsets, respectively and of the second electric machine, its rotor shaft being integral with a pinion engaged on an external toothings of the ring gear of the first epicyclic gearset.

Claim 50 (New): A transmission according to claim 41, further comprising an operating controller, provided with:

a controller of the operating point of the motive power unit as a function of predetermined stresses;

a controller of the operating point of the internal combustion engine that receives an operating point target value from the controller and generates adjusting signals suitable for actuators for determination of the operating point of the internal combustion engine;

an operating controller of the first and second electric machines respectively such that, for each machine, there are determined its mode of operation, either as a motor or generator, its speed of rotation and/or its torque or else its armature voltage and/or its armature current, especially in relation with a device for management of an electrical energy accumulator, the controller receiving a target value of the operating point from the controller and producing suitable adjusting signals for the pilot-control circuits of the electric machines;

a transmission-mode-changing controller, which determines the open or closed state of the clutch and/or of the brake such that one mode among at least two modes of operation of the infinitely variable transmission is selected by an adjusting signal of the controller.

Claim 51 (New): A power-splitting infinitely variable transmission with two modes of operation, wherein the constituent elements thereof are distributed between two power

trains connecting the internal combustion engine in parallel manner to the wheels of the vehicle, including two epicyclic gearsets, two electric machines, one reducing stage and adjusting means that distribute the power between the two power trains differently depending on a mode of operation thereof, comprising:

a first compound gearset, which makes it possible to connect the internal combustion engine to the vehicle wheels along a first power-splitting train, and with a simple gearset, which makes it possible to achieve power splitting, as well as with a second compound gearset, such as to achieve a system for changing mode between at least two modes of operation of the infinitely variable transmission.

Claim 52 (New): A transmission according to claim 51, wherein the first compound gearset is provided with a first epicyclic gearset, to which the internal combustion engine is connected via its sun gear, the planet carrier of the first epicyclic gearset being connected to a reducing stage, the output of which is connected to the driving wheels of the vehicle and to the planet carrier of a second epicyclic gearset of the first compound gearset, the ring gears of the first and second epicyclic gearsets respectively being connected together, and their common movement being transmitted at a coupling over the secondary power-splitting train.

Claim 53 (New): A transmission according to claim 52, wherein the sun gear of the second epicyclic gearset is itself connected to the planet carrier of an epicyclic gearset, whose sun gear is connected to the rotary shaft of a second electric machine, a first electric machine of the electric variator of the transmission being coupled via its output shaft to a reducing stage, connected both to the ring gears of the first and second epicyclic gearsets and respectively of the first compound gearset, as well as to the ring gear of a first epicyclic gearset of a second compound gearset, which is also provided with a second epicyclic gearset

and which is configured in such a way that the planet carriers and the sun gears of its two epicyclic gearsets are coupled to one another, in that the planet carriers of the second compound gearset are temporarily integral with a frame or chassis by means of a first brake, while the ring gear of the second epicyclic gearset of the second compound gearset can be made integral with the chassis or fixed point by means of a second brake, and in that the sun gears of the epicyclic gearsets of the compound gearset are connected to the ring gear of the epicyclic gearset.

Claim 54 (New): A transmission according to claim 52, wherein the output shaft of the internal combustion engine is aligned with the common shaft of rotation of the primary compound gearset, of the compound mode-changing gearset and of the simple gearset for recombination of the two splitting trains,

wherein the internal combustion engine is directly connected without intermediate reducing stage via this shaft to the sun gear of the first epicyclic gearset of the first compound gearset, the planet carrier being double and common to the two epicyclic gearsets of the first compound gearset, the planet carrier being spun on the sun gear of the epicyclic gearset, fixed at the end of the shaft of the internal combustion engine, and spinning on the sun gear of the second epicyclic gearset of the first compound gearset, fixed on a first part of the shaft, a second part of which is aligned with the shaft and carries the planet carrier of the simple gearset, the common shaft carrying the following components, which can rotate freely on two bearings:

the ring gear, common to the two epicyclic gearsets of the first compound gearset, and the ring gear of the first epicyclic gearset of the second compound gearset;

the sun gear of the second compound gearset, which is integral with the ring gear of the simple gearset.

Claim 55 (New): A transmission according to claim 54, wherein the ring gear of the two epicyclic gearsets of the first compound gearset is provided with a single toothing to drive a single pinion of the sun gear mounted on the planet carrier, each planet gear of the planet carrier being double, meaning that it carries:

a first pinion engaged between the sun gear of the epicyclic gearset and the single toothing, in this case internal, of the ring gear, common to the two epicyclic gearsets;

a second pinion integral with the first pinion via their common spindle and engaged on the sun gear of the second epicyclic gearset of the first compound gearset;

wherein the planet carrier of the first compound gearset is mounted to rotate freely on a suitable bearing disposed on the output shaft of the internal combustion engine and is integral with a toothed gear engaged on a pinion integral with the vehicle wheels.

Claim 56 (New): A transmission according to claim 55, wherein the ring gear also carries an external toothing, which is engaged with a pinion mounted at the end of the shaft of the rotor of the first electric machine of the electric variator.

Claim 57 (New): A transmission according to claim 56, wherein the sun gear common to the two epicyclic gearsets of the second composite gearset is provided with a single external toothing to drive a single pinion of the planet gear mounted on the planet carrier of the second compound gearset, each planet gear of the planet carrier being double, meaning that it carries:

a first pinion engaged on the sun gear on the one hand and on an internal toothing of the ring gear of the epicyclic gearset integral with the common ring gear of the first compound gearset;

a second pinion, integral with the first pinion via their common spindle and engaged on an internal toothing of the ring gear of the second epicyclic gearset of the second compound gearset;

and in that the planet carrier of the second compound gearset is mounted to rotate freely between the sun gear and the ring gear of its first epicyclic gearset.

Claim 58 (New): A transmission according to claim 57, wherein the shaft carries the planet carrier of the simple gearset, which spins on the sun gear, whose shaft, aligned with the shafts, is connected to the rotor of the second electric machine.

Claim 59 (New): A transmission according to claim 58, wherein the mode-changing system is provided with:

a first brake, which is provided with a first lining integral with the ring gear of the second epicyclic gearset of the second compound gearset and a second lining integral with the case of the gearbox, a brake actuator being disposed between the two linings in such a way that, in response to the adjusting signal from transmission-mode-changing controller, the first brake is either opened or clamped;

a second brake, which is provided with a first lining integral with the planet carrier of the second compound gearset and a second lining integral with the case of the gearbox, a brake actuator being disposed between the two linings in such a way that, in response to the adjusting signal from the transmission-mode-changing controller, the second brake is either opened or clamped;

Claim 60 (New): A transmission according to claim 51, further comprising an operating controller connected by a bus to different sensors of the state of operation of the

vehicle as well as to sensors for detecting the intent of the operator and to a plurality of controllers, which are provided with:

 a controller of an operating point of the motive power unit as a function of predetermined stresses;

 a controller of an operating point of the internal combustion engine, which controller receives an operating point target value from the operating controller and generates adjusting signals suitable for actuators for determination of the operating point of the internal combustion engine

 an operating controller of the first and second electric machines respectively in such a way that, for each machine, there are determined its mode of operation, either as a motor or generator, its speed of rotation and/or its torque or else its armature voltage and/or its armature current, especially in relation with a device for management of an electrical energy accumulator, the said controller receiving a target value of the operating point from the operating controller and producing suitable adjusting signals for the pilot-control circuits of the electric machines in order to determine their respective operating points according to a four-quadrant current-voltage rule 1;

 a transmission-mode-changing controller, which determines the open or closed state of the first brake and/or of the second brake in such a way that one mode among at least three modes of operation of the infinitely variable transmission is selected by an adjusting signal of the operating controller, among which:

 in the first mode of operation, the brake blocks the planet carrier of the two epicyclic gearsets of the second compound gearset, the ring gear of the second epicyclic gearset spins freely, and the gearset functions as a simple gearset composed of the ring gear of first epicyclic gearset of the common planet carrier and of the common sun gear;

in a second mode of operation, the mode-changing system is disposed in such a way that the two brakes are both clamped, all elements of the compound gearset being blocked in such a way that the two electric machines are directly connected to the primary power-splitting train, and either one or the other or both can operate both as a generator and as a motor;

in a third mode of operation, the first brake is open and the second brake is clamped, in such a way that the ring gear of the second epicyclic gearset is braked and functions as a support point.